REMARKS

Claims 1-3, 7, 8, 13-27 and 29-31 remain pending. Claims 8, 21-27, 29 and 30 have been determined allowable over the prior art of record and claims 3 and 13 have been determined as reciting patentable subject matter. Applicants submit arguments for overcoming the rejections of the remaining claims, 1, 2, 7, 14-20 and 31, over the prior art of record. Accordingly, Applicants respectfully submit that the present application is in condition for allowance.

## I. Claim Rejection - 35 USC §112, second paragraph

*In the non-final Office Action dated October 27, 2010, claim 1 is rejected under 35 USC §112, second paragraph, as being indefinite.*

Claim 1 has been amended to delete the phrase "plastic working such as". No new matter was added. Accordingly, Applicants respectfully submit that the language of claim 1 is definite and fully complies with the requirements of 35 USC §112, second paragraph. Applicants respectfully request reconsideration and withdraw of the rejection.

## II. Claim Rejections - 35 USC §102(b)

*In the non-final Office Action dated October 27, 2010, claims 1, 7, 17, 18, 20 and 31 are rejected under 35 USC §102(b) as being anticipated by WO 00/31310 of Michaluk et al.*

WO '310 is newly cited in the present application. Applicants respectfully submit that the disclosure of WO '310 has been misinterpreted in the Office Action dated October 27, 2010 and that the claims, particularly independent claims 1 and 7 of the present application, are not anticipated and are patentable over the disclosure provided by WO '310.

WO '310 discloses a raw material high-purity tantalum metal from which "final products" can be made. For example, see the Abstract of WO '310 which states "High purity

tantalum metals and alloys containing same are described. ... Also described are articles and components made from the tantalum metal". Also see page 1, lines 5-6, of WO '310 which states that "The present invention relates to metals, in particular tantalum, and products made from tantalum" and page 2, lines 9-12, which states that "A feature of the present invention is to provide a high purity tantalum" ... "Another feature is to provide articles, products and/or components containing the high purity tantalum." The point here is that WO '310 clearly distinguishes between a raw material high purity tantalum metal and "final products" made from the tantalum metal.

One of the "final products" disclosed by WO '310 is "sputtering targets". For example, page 3, lines 3-4, of WO '310 clearly states that "The present invention also relates to a high purity tantalum, e.g., suitable for use as a sputtering target, having a **fully recrystallized** grain size".

WO '310 clearly describes a high purity tantalum metal raw material that is subjected to certain required processing to ultimately manufacture a sputtering target and that the target does not consist simply of the raw material high purity tantalum metal without the required processing. For example, see page 3, lines 8-11, of WO '310 which states that "The present invention further relates to manufacturing plate and sheet from the above-mentioned tantalum by flat-forging the tantalum, machining into rolling slabs, rolling into plate or sheet, then annealing the plate or sheet ... Final products such as sputtering targets can be then machined from the annealed plate or sheet." Thus, only after the tantalum metal is subjected to the above process steps, including final annealing, is a sputtering target created.

Referring to the "Detailed Description" section of WO '310, a raw material tantalum metal is discussed on page 4, line 12, to page 9, line 22. This discussion is limited to the raw material tantalum metal and in no way discloses a "final product" such as a sputtering target.

This section of WO '310 discloses that the raw material tantalum metal must be at least 80% recrystallized, and more preferably fully recrystallized. However, this is with respect to the raw material tantalum metal and not a sputtering target. WO '310 clearly requires various process steps to be performed to the raw material before a final product, such as a plate or sheet of tantalum from which a sputtering target can be machined.

After discussing the raw material, WO '310 then states on page 9, lines 23-26, that "The high purity tantalum ingot can then be thermomechanically processed to produce high purity tantalum containing product. The fine, and preferably fully recrystallized, grain structures and/or uniform texture is imparted into the product through a combination of cold and/or warm working and in-process annealing."

WO '310 specifically discusses the formation of a sputtering target starting on page 10, line 14. For example, WO '310 requires: cleaning of surfaces of the raw material high purity tantalum metal; flat forging into rolling "slabs"; annealing to achieve uniform recrystallization; rolling to form at least one "plate"; final annealing; cleaning; and machining into a sputtering target of desired dimensions.

With respect to "final annealing", WO '310 states that "with respect to annealing of the tantalum plate, preferably this annealing is in a vacuum annealing **at a temperature for a time sufficient to achieve complete recrystallization of the tantalum metal**."

Accordingly, Applicants respectfully request that the disclosure of WO '310 be reconsidered. WO '310 may disclose a raw material high purity metal being at least 80% recrystallized (i.e., meaning 20% or less is non-recrystallized); however, this disclosure of the tantalum metal is before any processing required to manufacture a sputtering target. The raw material metal must be forged, annealed, rolled and subject to final annealing and machining

before a "sputtering target" comes into existence. With respect to the sputtering target, WO '310 discloses a sputtering target which is completely recrystallized.

Thus, WO '310 teaches a "sputtering target" with "complete recrystallization". In contrast, claim 1 of the present application requires a "tantalum sputtering target having a non-recrystallized structure" and claim 7 requires steps of "subjecting a molten and cast tantalum ingot or billet to forging, annealing and rolling processes, and performing plastic working on said ingot or billet to provide the tantalum sputtering target with a non-recrystallized structure".

With respect to rejections made under 35 USC §102, it is clear that a claim of a patent application can be properly anticipated under 35 USC §102 only if each and every element or process step is found described in a single prior art reference. The identical invention must be shown in as complete detail as contained in the claim. The elements and method steps identified by the reference must be arranged as required by the claim. If a prior art reference relied on in a rejection made under 35 USC §102 does not contain every element or process step recited in the claim in as complete detail as is contained in the claim and arranged as recited in the claim, the rejection must be removed.

WO '310 clearly distinguishes between a raw material high purity tantalum metal and a sputtering target. The raw material metal must undergo certain steps (forging into slabs, annealing, rolling into plates, final annealing, and machining) before a "sputtering target" is created. The raw material metal may not be fully recrystallized according to WO '310; however, after the raw material metal is processed as required by WO '310 (forging into slabs, annealing, rolling into plates, final annealing, and machining), the produced sputtering target is required to be fully or completely recrystallized.

Finally, WO '310 discloses Examples on pages 13-20. On page 17, line 3, WO '310 discloses that the samples are "fully recrystallized" and on page 17, lines 5-6, WO '310 discloses

that any "unrecrystallized" areas will be limited to "the surface region of the plates" and can be "removed by machining". Thus, even in the event that unrecrystallized areas exist in the rolled plates, WO '310 teaches that these areas will be completely removed during a machining step which is a step necessary before the "plate" is ultimately converted into a "sputtering target".

For the reasons discussed above, Applicants respectfully submit that independent claims 1 and 7 of the present application are not anticipated by WO '310. Accordingly, Applicants respectfully request reconsideration and removal of the §102(b) rejections of claims 1, 7, 17, 18, 20 and 31 of the present application.

## III. Claim Rejections - 35 USC §103(a)

*In the non-final Office Action dated October 27, 2010, claims 2, 14-16 and 19 are rejected under 35 USC §103(a) as being obvious over WO 00/31310 of Michaluk et al.*

Applicants respectfully submit that the claims of the present application are not obvious in view of WO '310 for the same reasons discussed above with respect to the claims not being anticipated. While WO '310 may disclose a raw material metal that is mostly (80% or more) recrystallized, it clearly requires this raw material to be subject to processing before a "sputtering target" is created and these processes (forging to form a slab, annealing, rolling to form a plate, final annealing, and machining) produce a sputtering target with "complete recrystallization". WO '310 further discloses that the only possible location for "unrecrystallized areas" would be on "the surface of the plate" and that these are removed by machining ultimately required to produce a sputtering target. Thus, no part of a "sputtering target" disclosed and taught by WO '310 will have a non-recrystallized structure and no process disclosed by WO '310 will produce a sputtering target having a non-recrystallized structure. Rather, WO '310 discloses sputtering targets and processes providing "complete recrystallization".

In addition, one of the process steps clearly required by WO '310 to convert a mere tantalum raw material metal into a sputtering target is **final annealing** of a rolled plate. Page 19, line 23, to page 20, line 8, of WO '310 clearly requires: "the final anneal temperature is preferably kept at 950-1000°C, more preferably 1000°C" for "flat products"; and "final anneal temperature is preferably 950-1100°C, and more preferably is 1050°C" for "round processing". Accordingly, if one of ordinary skill in the art were to follow the teachings of WO '310 to produce a sputtering target, the end result would be a completely recrystallized structure and not a non-recrystallized structure as required by the claims of the present application. Thus, WO '310 teaches-away from the present invention. "Teaching away" is the antithesis of the art suggesting that the person of ordinary skill in the art go in the claimed direction. Essentially, "teaching away" is a per se demonstration of lack of obviousness. In re Fine, 873 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

With respect to this point, Applicants refer to "Comparative Example 1" on page 12, Table 1, and on page 19, line 21 to page 21, line 2, of the present application, as filed. Final annealing for Comparative Example 1 of the present application was at 1173 K (900°C) and the structure of the target was substantially completely recrystallized. When considering this result, if the final annealing temperature of Comparative Example 1 were set to 950°C, 1000°C or 1050°C as directed by WO '310, the structure of the target would certainly be completely recrystallized thereby teaching away from a non-recrystallized structure required by the claims of the present application.

It should be noted that Table 3 on pages 21 and 22 of WO '310 disclose plates having been annealed at 950°C and 1000°C being 98% or 99% recrystallized. Of course, this is before "machining" which would remove any non-recrystallized surface areas from the plates as required by the teachings of WO '310. In addition, Applicants submit that this may be a

measurement error because, as clearly shown by Comparative Example 1 of the present application, a final annealing step of 900°C will provide substantially complete recrystallization.

It should also be noted that Example 5 of the present application uses a final "stress relief" annealing temperature of 1173 K (900°C) yet is only 20% recrystallized. This is because final annealing is performed for a very short period of time aiming only to relieve stress not to recrystallize the structure. By way of comparison, Comparative Example 1 of the present application performs final annealing for a much longer period of time. WO '310 teaches final annealing steps to completely recrystallize the structure with the only possibility of non-recrystallized areas being on the surface of the plate which can be removed via the machining step.

The present invention requires the final working process step to be cold rolling or annealing at a temperature of 1173 K (900°C) or less in which recrystallization will not occur and in which a worked structure will remain. See page 7, lines 6-11, and page 7, line 26, to page 8, line 3, and Examples 1-6, and claims 7 and 8 of the present application, as filed. In contrast, WO '310 performs final annealing at a temperature and time sufficient for achieving full recrystallization. See page 10, line 14, to page 12, line 7, of WO '310. The final annealing temperature required by WO '310 is 950 to 1050°C. Accordingly, Applicants respectfully submit that the final working process steps of WO '310 do not overlap with those of the present invention and will and are intended to provide different (i.e. opposite) results.

Thus, with respect to independent claim 1 of the present application and all claims depending therefrom, WO '310 discloses a Ta target required to have a complete recrystallized structure and fails to disclose a Ta target having a non-recrystallized structure.

With respect to independent method claim 7 of the present application and all claims depending therefrom, WO '310 requires a final annealing step at a temperature of 950 to 1050°C

for a time sufficient to completely recrystallize the structure. The only possible non-recrystallized areas on the finally annealed plate of WO '310 may be on the surface and are removed by machining steps. (See page 17, lines 5-6, of WO '310). In contrast, claim 7 requires process steps that provide the tantalum sputtering target with a non-recrystallized structure.

The rate of recrystallization of the structure is clearly dependent upon annealing performed in the final stage of processing. WO '310 teaches a high temperature at a time sufficient for complete recrystallization as a final annealing step. Thus, there is no overlap in percent of recrystallization of the sputtering target of the present invention and that of WO '310. The teachings are opposite.

Turning specifically to claim 2 of the present application, it requires that at least 20% of the structure of the sputtering target is non-recrystallized. Applicants respectfully submit that WO '310 fails to disclose this requirement of claim 2 or render claim 2 obvious. WO '310 discloses a starting metal material having certain qualities; however, this metal material is then subject to numerous process steps before being converting into a "sputtering target". The "plate" produced by WO '310 is 98% or more recrystallized and any non-recrystallized areas are located on the surface of the plate and are removed via machining before a "sputtering target" is created as a result of the process. Thus, WO '310 discloses a sputtering target with a completely recrystallized structure and clearly fails to disclose the limitations required by claim 2 of the present application.

Further, WO '310 requires the final annealing step to be performed at a temperature of 950 to 1150°C. See page 15, lines 17-18, of WO '310. With this final annealing process, the plate will be 98 to 100% recrystallized which fails to meet the limitation disclosed by claim 2 of the present application. Still further, any non-recrystallized areas of the plate would be on the surface of the plate and would be removed during a machining step as taught by WO '310. Thus,

WO '310 discloses a sputtering target with a completely recrystallized structure and clearly fails to disclose the limitations required by claim 2 of the present application.

Accordingly, Applicants respectfully submit that the claims of the present application are patentable and non-obvious over WO '310 and respectfully request reconsideration and removal of the obviousness rejection.

## IV. Allowable Subject Matter

In the Office Action dated October 27, 2010, method claims 8, 21-27, 29 and 30 are indicated as being allowable and claims 3 and 13 are indicated as reciting patentable subject matter.

For the reasons stated above, Applicants respectfully submit that all pending claims are patentable over the prior art of record including newly cited WO '310 which clearly discloses a Ta sputtering target having a structure that is completely recrystallized.

## V. Conclusion

In view of the above amendments and remarks, Applicants respectfully submit that the claim rejections have been overcome and that the present application is in condition for allowance. Thus, a favorable action on the merits is therefore requested.

Please charge any deficiency or credit any overpayment for entering this Amendment to our deposit account no. 08-3040.

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